RESEARCH REPORTS

The *Kilopilopitsofy, Kidoky,* and *Bokyboky:* Accounts of Strange Animals from Belo-sur-mer, Madagascar, and the Megafaunal "Extinction Window"

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In July and August 1995, the authors interviewed elderly Malagasy with knowledge of the traditions and natural history of their home areas, centered on the villages of Belo-sur-mer, Antsira, and Ambararata, on the southwest coast of Madagascar. Several individuals related personal experiences in which they claim to have seen and heard animals that do not match any known extant animal of Madagascar. Two of the mystery animals, known locally as the *kilopilopitsofy* and *kidoky,* were described in terms similar to creatures detailed in historical accounts and folklore recorded in Madagascar between the mid-1600s and the end of the nineteenth century. The former of these has been compared by some authors to the dwarf hippopotamus and the latter to a giant lemur, animals generally inferred from radiocarbon dating of last known occurrences to have gone extinct early in the present millennium or perhaps a few centuries later. Stories by these same informants concerning extant animals demonstrate their accurate knowledge of the fauna. Magical powers are ascribed to some animals, such as the *bokyboky,* a viverrid *(Mungotictis)* that occurs in the region. Radiocarbon dates obtained recently on some of the extinct megafauna, showing that some extirpated taxa may have survived until recent centuries, confirm that ethnographic sources of information on these species should not automatically be dismissed as irrelevant or unreliable. *[Madagascar, extinctions, megafauna, hippopotamus, lemur]*

Those who study prehistoric extinctions have generally discounted the relevance of oral traditions concerning creatures that are not among the extant fauna (e.g., articles in Martin and Klein 1984). In a situation such as that of the demise of mammoths and a host of other megafauna in North America, where abundant radiocarbon evidence suggests that the extirpated fauna disappeared more than 10 millennia ago, it is perhaps understandable that paleontologists would fail to take seriously the relevance of traditional wisdom concerning these animals. This is probably less a matter of cultural bias, as charged by Deloria (1995:50), than confidence in the radiocarbon dating method. Any information collected from Native Americans since European contact concerning animals that apparently disappeared so long ago would seem improbable regardless of one's cultural or disciplinary perspective, unless one is willing to categorically reject the validity of ^{14}C as a measure of age.

But what of other extinction events? Care should be taken to avoid generalizing from the North American extinctions, or any other single case, to the larger debate in anthropological circles concerning "modern science vs. oral tradition." Keith Thomas (1983:74) is perhaps representative of the attitudes of many scientists in arguing that what he calls "popular knowledge" has been "eclipsed by the more thorough-going inquiries of scientists, whose viewpoint was not narrowly utilitarian and who rapidly became disillusioned to discover that there were limits to rural curiosity."

We wish to explore in this paper a case clearly to the contrary, in which ethnohistorical accounts and recently collected oral traditions should be taken seriously as a

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possible means of augmenting our meager knowlege of an extinct megafauna. This is a reasonable assertion in Madagascar because, unlike North America, some of the extinct animals have been shown by radiocarbon dating to have survived at least until very nearly the time of European contact, if not well after.

Etienne de Flacourt, appointed governor of Madagascar by the French East India Company, wrote in his *Histoire de la grande ile de Madagascar* (1661) quite detailed and accurate descriptions of many of the native animals of the island, some from firsthand observation and others from descriptions provided by native Malagasy. Scholars have puzzled ever since, however, over a few animals that people told him still existed in the interior and the derivation of their names. One, a giant bird called the *vouron patra* or *vorom-patrana,* has been compared frequently to the elephantbirds (*Aepyornis* spp.), giant ratites. Like some other members of the extinct endemic megafauna, it is thought to have inhabited Madagascar at least until early in the present millennium, based on radiocarbon evidence (summarized in Dewar 1984). Another animal Flacourt describes, the *tretretretre* or *tratratratra,* has been likened to various of the extinct giant lemurs (Godfrey 1986; Jolly 1980). A third unidentified animal, the *mangarsahoc* or *mangarotsaoka,* has especially commanded the notice of subsequent authors, as, to a greater extent than the other two creatures, eyewitness accounts of an animal fitting Flacourt's general description continued to surface in Madagascar until late in the nineteenth century.

The German zoologist Josef-Peter Audebert (1882), while collecting animals in Madagascar in 1876, received a piece of "antelope-like" hide stamped with enigmatic Arabic characters, which his source claimed was taken from the *tsy-aomby-aomby* ("not-cow-cow"). He even mounted an expedition to look for the mysterious creature, with a putative eyewitness for a guide, but gave up the unsuccessful search after encountering an ethnic conflict and other difficulties.

The French folklorist Gabriel Ferrand (1893, cited in Godfrey 1986) recorded legends of the Betsimisaraka people of the northeast concerning the tsy-aomby-aomby, who described it as having the body of a cow, but lacking horns or cloven hooves. Similarly, the French administrator of the Mianarivo district (Raybaud 1902) recorded an eyewitness account of a sighting of the *omby-rano* in a remote part of the highlands in 1878. This term, meaning "water-cow," was also used by villagers who told Kaudern in 1912 (cited in Mahé and Sourdat 1972) that the hippo still lived in Lake Kinkony in western Madagascar. The Malagasy man in Raybaud's account claimed that a neighbor told him that four of these creatures, which Raybaud believed to be the now-extinct dwarf hippopotamus of Madagascar (*Hippopotamus lemerlei* or *H. madagascariensis*), had destroyed nearby cornfields during the night. When he investigated, the man said, the creatures fled to a nearby crater lake and disappeared underwater.

The extent to which the details of these stories appear to match the appearance and behavior of the hippopotamus has led Godfrey (1986) to conclude that Madagascar's hippo may have survived in pockets of remote habitat until the late nineteenth century. To this day, legends of a hippo-like creature that *formerly* lived on the island, sometimes by the names given above, sometimes by others such as the *lalomena* (perhaps from *lalo,* "to be passed by" + *mena,* "red") or *songomby* (etymology discussed below), are widespread in Madagascar. Legends of giant birds and large primate-like creatures are also prevalent, but we have not previously encountered convincing accounts of twentieth-century sightings of any of these animals.

In late July and early August 1995, in the remote region of Belo-sur-mer on the southwest coast of the island, we collected ethnographic data from several elderly Malagasy who related personal stories of direct encounters with two animals that could not be assigned to any known extant taxon. One, the *kilopilopitsofy* ("floppy ears"), matches well the descriptions provided by Flacourt and nineteenth-century authors for an animal that may have been a dwarf hippopotamus, and the Belo informants provide some additional details not in earlier accounts. The other, which they called the *kidoky* (derivation unknown), is asserted by the informants to be a large, terrestrial lemur.

Location and Methods

Site Characteristics

Belo-sur-mer is a remote fishing village on the southwest coast of Madagascar (20°44′S 44°01′E, el. *ca.* 1-10 m ASL). It serves as the administrative center for the surrounding region, which is very sparsely populated (<5 persons km^{-2} over an area >10,000 km^2; Battistini and Hoerner 1986). The district lies about midway between Morondava and Morombe, larger regional centers. Although Belo-sur-mer is located on the sea as the name indicates, the only other large village in the area, Antsira, is approximately 7 km inland to the east (Figure 1). Located on a large salt pan, Antsira is essentially the "company town" for the active salt works there. Smaller villages, including Ambararata (Figure 1), are arrayed along the road between Belo-sur-mer and Morondava.

Most people of the area are of the Vezo ethnic group, although persons who identify themselves as Sakalava, Masikoro, or Vazimba are frequently encountered, and some people of Betsileo or other ethnic identity are present as relatively recent immigrants to the area. A small tourist hotel under Franco-Mauritian management has recently been built on the beach south of Belo-sur-mer and provides a few Malagasy with an alternative to the traditional employment of the area, which consists of subsistence fishing,

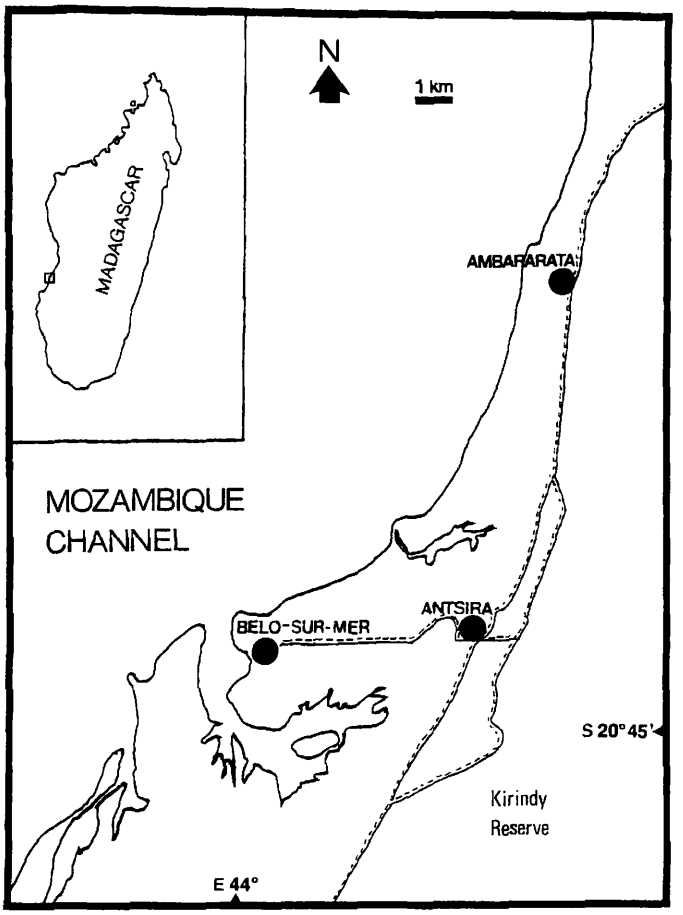

Figure 1. Solid circles indicate villages in which interviews were conducted. Sightings of animals described occurred in the vicinity of these villages and the portion of the Kirindy Reserve to the east of the villages.

salt production, and very limited cultivation and woodcutting. Cattle raising and rice cultivation, so characteristic of most of Madagascar, are marginal occupations in this semi-desert region.

Belo-sur-mer receives approximately 500 mm mean annual precipitation (Battistini and Hoerner 1986). Much of the vegetation is typical of slightly more arid regions to the south, including the tree-sized succulents *Didierea madagascariensis* and *Euphorbia stenoclada,* and several shrub species with reduced leaves and other adaptations to aridity. Mangrove vegetation occurs along the estuaries, and, at more inland locations, thorny bushland and bushed grasslands grade into dry woodland and thicket. Fresh water is scarce on the surface during the dry season, consisting primarily of small rivers and *matsabory,* small ponds with clay bottoms. Only a few of these retain water in exceptionally dry years. Near the coast, a lens of fresh water lies a few meters below the ground surface, and villagers tap this potable water with shallow, hand-dug wells.

Animals commonly observed in this region include the mouse lemur *(Microcebus murinus),* Verreaux's sifaka *(Propithecus verreauxi verreauxi),* and several viverrid carnivores, including *Cryptoprocta ferox* and *Mungotictis decemlineata* (Albignac 1973; Haltenorth and Diller 1980). The bush pig *(Potamochoerus porcus)* is very common, despite hunting pressure.

Method of Data Collection

Ethnographic research was not the primary goal of this expedition. However, our search for paleontological, archaeological, and paleoecological sites that could provide evidence regarding Holocene extinctions and environmental change has often been enhanced by interviewing local inhabitants with knowledge of natural history, particularly elderly people and those who work in occupations that require knowledge of landscapes remote from human habitations, such as woodcutters, hunters, and fishermen. Our primary motivation in initiating the interviews at Belo-sur-mer and adjacent villages was to find the "subfossil" megafaunal sites visited here with great success late in the last century and in earlier decades of the present century by several paleontological investigators (summarized in Chanudet 1975). We have now relocated the three primary sites reported by these earlier investigators, and also have found bones in six other locations nearby. Results of excavation, dating, and paleoecological analyses are summarized in Burney (1997) and forthcoming publications.

In the course of these informal interviews, residents began to volunteer information regarding their belief that, of the animals whose bones we were seeking, most were extinct in the area, but some of them perhaps were not. We therefore decided to interview these and other elderly people in more detail, and with certain methodological safeguards, as follows:

1. It was ascertained from questions regarding personal chronology and memory of historical events that the person had been living in the area for a long time, including the time period of the stories related.
2. Each interviewee in Table 1 (an individual or a group) was interviewed separately from the others listed, so that stories and descriptions were related independently. Of course, this technique is far from infallible, as there was no way to prevent interviewees from "comparing notes" on their conversations with the researchers.
3. Prompting for specific answers was generally avoided (i.e., interviews were begun by asking for information about the fossil sites, animals, and plants that occur in the region). Descriptions of any unknown animals they mentioned were elicited without recounting details from previous interviewees.
4. The interviewees' knowledge of extant wildlife known to live in the region was tested by asking each person to pick, from color plates of unlabeled Malagasy fauna (Haltenorth and Diller 1980), those species that they had seen in the vicinity. Each person was adept at

Table 1. Interview Results.

Name	Age (1995)	Location	Description	Observations
1. Dabelatombo, Armand	ca. 60	Belo-sur-mer	A "sorcerer." First to mention fantastic creatures, introduced eyewitnesses. Very poor eyesite.	Had not seen *kilopilopitsofy* or *kidoky,* but knew of them from others. Many stories of *bokyboky.*
2. Constant	ca. 70	Antsira	Man who works at salt plant, and his wife and son.	In 1976, heard the *kilopilopitsofy* at night, said some neighbors saw it.
3. Sangitro	middle-aged	Antsira	Watchman at salt factory.	Said people had seen and heard animal at several locations, called *tsungaomby.* Selected picture of hippopotamus.
4. Pascou, Jean Noelson	85	Belo-sur-mer	Oldest man in region. Good health and eyesight, literate.	Many details of *kilopilopitsofy, kidoky,* and *bokyboky,* including appearance and sounds. Selected hippo picture. Last saw *kilopilopitsofy* in 1976.
5. Soariko, Fatima	59	Belo-sur-mer	Wife of Pascou, good health except for arthritis. Very knowledgeable of local plant uses. Marginally literate.	Parents saw *kilopilopitsofy* in 1946. Had personalized story of encounter.
6. François, Fañodoña, Fañainabe, Jean-Paul, Itampa, Troba	25–45	Ambararata	Woodcutters who claimed to have seen *kidoky.*	Demonstrated call and gait of *kidoky.* Described coloration. All details in agreement with Pascou's account.
7. André	ca. 35	Ambararata	Woodcutter who frequents remote areas, said by others to know much about all the animals.	Reluctant to discuss *kilopilopitsofy* and *kidoky,* but willing to guide us to promising locations (offer declined due to time limitations).

picking and naming from the book such local animals as the bush pig, sifaka, mouse lemur, and fossa.

5. Interviews were conducted in the local form of Malagasy and translated by Ramilisonina. (Burney also speaks some Malagasy, but was dependent on Ramilisonina for clarification of some nuances.) Notes were taken by Burney and Ramilisonina and subsequently compared for clarity and consistency.
6. After interviewees had finished describing fully any animals mentioned that were not readily ascribed to known extant taxa, they were shown color plates of unlabeled animals of Africa and Madagascar (Haltenorth and Diller 1980) and asked whether they recognized any of these pictures as similar to any of the animals described.

Interview Results

On July 29 and 31, 1995, our camp was visited by Armand Dabelatombo (Table 1, Interviewee #1), age about 60, who said he had some knowledge of the bones that interested us. He identified himself occupationally as a "sorcerer," using the French term *sorcier,* and indicated that he did some of his divining with two large fragments of a long bone shaft (of *Aepyornis*) that he had dug up while searching for minerals with medicinal or divination value in a salt pan at Antsira. He believed them to be from the *vorombe* ("big bird"), which he asserted to have existed there a long time ago, but now was extinct "like the dinosaurs." He remembered the Lamberton expedition to Belo-sur-mer just before World War II (Lamberton 1946), and indicated that, as a small boy, he marveled at the copious quantities of strange bones dug up near the village by the Frenchman and his large Malagasy crew. He also remarked that a few of these animals or something like them may have been seen alive by people in the area who are still living. We naturally were intrigued by his dubious but confident assertion and, on further inquiry, were informed that he would introduce us to some of these people. This man, who by now had very poor eyesight, nevertheless knew many interesting stories about the animals of the area and gave us

Malagasy names for the lemurs and viverrids he knew that lived in the area. This list and the descriptions of the appearance and habits of the animals were accurate reflections of the local fauna in most particulars.

He ascribed magical powers to some animals, particularly one he called the *bokyboky* (his spelling, said to be an imitation of its call), which we later discovered to be one of three vernacular names sometimes used for viverrids of the genus *Mungotictis.* Belo-sur-mer is in the range of *M. decemlineata* (Albignac 1973). According to Mr. Dabelatombo (and this was confirmed by subsequent interviewees), persons knowledgeable of the forests to the east beyond the salt pan catch the gravid females during the rainy season (centered around January-February) when they are very slow and sell them to people in the villages to eliminate snakes and rats. They are, as he put it, "a terrible animal," capable of wiping out these vermin (or a flock of chickens if not constrained), sometimes employing a strange means he ascribed to their awesome flatulence. They put their tail down the hole of a rat or snake and kill it instantly by, as he said in French, *peter* (farting).

On August 1, Ramilisonina was introduced to Constant, a man about 70 years of age from Antsira (Table 1, Interviewee # 2), his wife, and son. They related, with considerable apparently genuine excitement, their personal experience with an animal they called the kilopilopitsofy. The animal came around their house on a night in 1976, and, although they could not see it well in the darkness, its grunting, breathing, and walking were so loud that it made the dogs very excited and woke up the neighbors. When people went outside, it fled toward the mangroves and apparently disappeared underwater. Our inquiry regarding others who might have seen it elicited the opinion that it was seen the same year at Belo-sur-mer, where, once again, it fled into the water.

Another interviewee (#3), the night-watchman at the salt factory, named Sangitro, said he had not seen it, but he had heard of this animal, also known as the *tsungaomby,* pronounced *songomby.* (These and similar terms are sometimes applied to feral cattle, but there are clear cases of application to a hippo-like animal—cf. *"songompy"* in White [1930:210]—note that *si n'gombe* means literally, in Kiswahili, "not-cow.") He said it had been seen by people throughout the region, and as far away as Ranohira (250 km SE near Isalo National Park) and Ankazoabo (several places in the region have that name, the nearest lying between Belo and Morondava). His own opinion was that the creature was a hippopotamus, and, when we produced the book with color plates of African and Malagasy animals (Haltenorth and Diller 1980), he picked the African hippopotamus *(H. amphibius).* Like subsequent informants who were shown the plates, he said it was not exactly right because this thing people had seen was generally described as having large ears.

Up to this point, our interviewing simply involved holding informal conversations with interviewees 1-3 in the course of pursuing our primary goals of excavating bones of the extinct animals and studying their paleoecology. Despite the considerable risk of being accused of doing "cryptozoology," our group decided that these people seemed quite serious about this, and agreed in critical details among themselves (and, most importantly, with the early historical accounts cited above, which also include the surprising observation that the ears were large and pendulous). We therefore decided to interview other persons who claimed to be eyewitnesses, by inviting them singly to our camp for lunch and talk. We explained that we were seeking information about the early paleontologists and the location of their excavations. This was true, but only a part of our goal. We were ready with a battery of questions, pictures, and a cautious protocol (see "Methods" section) to delve further into this intriguing (but professionally perilous) matter of unidentified animals.

On August 2, the person said by others (including the village chief) to be the oldest man in the region, Jean Noelson Pascou (Table 1, Interviewee #4), age 85, paid the first of many visits to our camp. He lived in Belo-sur-mer, was the grandfather of one of our workmen, and got around quite well on his own. His eyesight was keen and he was literate, having attended school in the district from 1923–30. He had many richly detailed, internally consistent, and generally accurate stories of local animals. He had also seen the kilopilopitsofy several times, best and most recently in 1976. According to Pascou, this animal is cow-sized, but without horns. He had only seen it at night, and, in that poor light, it was very dark-skinned, perhaps black, except it had some pink *(mavokely)* coloration around the eyes and mouth. Its ears were fairly large and flopped about. When we showed him a color picture of an elephant, on the theory that these stories were perhaps borrowings from the African coast, brought by sailors who navigate the Mozambique Channel for regional trade, he was quite amused. "Oh no," he chuckled knowingly, "that's an elephant." He said that he had seen an elephant years ago, when a French farmer brought one to Mahajanga (Majunga), and that the kilopilopitsofy was not as big, had a larger mouth, no trunk, and escaped by running to the water.

Pascou was quite adept at imitating animal noises, having demonstrated for us various lemur calls and the grunting of the bush pig, and he imitated for us the call of the kilopilopitsofy. He gave a series of deep, drawn-out grunts, very similar to *H. amphibius* (and quite different from the bush pig). He denied, however, having ever visited the African coast or seeing an African hippo. There has never, to our knowledge, been a hippo in the Parc Tsimbazaza zoo or any other public or private venue on the island, so we offer no explanation as to how his imitation of the call of the kilopilopitsofy happened to match so well the sound of

H. amphibius. He observed that it had large, flat feet, not cloven like a cow, and very big teeth.

He also volunteered information on another animal that he said was found in the forests of the adjacent interior, but was rare. This one he called the kidoky (by pronunciation and dictated spelling, although when he wrote the name down for us later, he spelled it *kindoky*). This animal, he said, was something like a sifaka, but with a face like a man, and about the size of a seven-year-old girl, his great-granddaughter, standing nearby when he related the story. He said he got a particularly good look at one nearby in 1952, and it had a dark coat but a conspicuous white spot on the forehead and another below the mouth. It is a shy animal, he says, and when encountered, flees on the ground rather than climbing trees like a sifaka. It moves by a series of leaps, and perhaps can stand on two legs, he believes.

He imitated its call, a long single whoop, somewhat reminiscent of a short call of the indri *(Indri indri)* of Madagascar's east coast rain forest, the largest living lemur. Shown the picture of the indri, he said that was not it, that this animal had a rounder face, more like the sifaka. He said that if one hears its call and imitates it effectively, it will come closer and continue calling. He was of the opinion that this might be because they are usually solitary and are lonely for their kind.

He also had stories concerning the bokyboky and, when asked to pick it from a color plate of lemurs, said it was not one of them. He instead chose a plate of viverrids, with African and Malagasy species pictured together, and said he believed it was one of them, but he wasn't sure which. *Mungotictis* was one of those pictured, but we did not know at that time that bokyboky was a local vernacular name for this genus. He said that he had one as a pet about 1942, and that it was very effective against rats.

On August 3, we interviewed Fatima Soariko (Interviewee #5, Table 1), age 59, who is the wife of Pascou. She was very knowledgeable of medicinal uses of local plants and gave us a lot of information on these and on many aspects of life and climate in earlier times. Notably, she had a good memory for stories told her by her elders regarding climate and vegetation changes in the late nineteenth and early twentieth century. Pascou later confirmed these with stories told him by his grandmother, who was born ca. 1878 and lived almost a century. One of Fatima's stories was relevant to our present subject, and appears below in paraphrased English:

> In 1946, when I was a girl of 10, some of my neighbors saw the kilopilopitsofy one night when it came near our compound. I was sleeping, but somebody came to warn us it was near and my parents got up to go scare it away. While they were gone, an insect crawled into my ear. It was very painful, and I cried out. My parents and neighbors came running back, carrying spears and sticks, because they had seen the kilopilopitsofy and were afraid that I was screaming because it had attacked me.

She said that she never saw the animal herself, but her parents and neighbors described it to her in the same terms related by other informants: a large cow-like animal with no horns, a large mouth full of big teeth, and a tendency to escape into the water.

Although our work with excavation and sediment coring occupied most of our remaining time in the region, we did have the opportunity one day, while working near the village of Ambararata (Figure 1), northeast of Belo-sur-mer on the edge of dense thicket and dry forest, to ask a few villagers if they knew anything about two animals we had heard stories about, the kilopilopitsofy and the kidoky. We interviewed a middle-aged woodcutter named François, with five of his friends (Interviewee #6 listed in Table 1). François and these apparently younger men all indicated that they spend time working in the forests and thickets inland from the main road between Morondava and Belo-sur-mer toward the east. They had no personal knowledge of the former animal, but the subject of the kidoky elicited many excited comments and gestures. Several of them said they had seen and heard this animal in recent years. Their description was essentially identical to Pascou's, including the appearance of the face. One insisted that there was "much white" on the body, but others were not sure. François imitated the call, a long "whooo," like the call uttered earlier by Pascou. These men noted that they had never seen it climb a tree, it just flees over the ground in short leaps. Burney demonstrated for them the gait of the sifaka on the ground, a distinctive sideways leaping. "No," corrected one of them, "that's a sifaka." The kidoky, he proceeded to demonstrate, gallops forward (in a baboon-like manner). They also reiterated Pascou's observation that one can, by imitating its call, draw it closer and provoke additional calling.

To our question of whether anyone had seen one recently and could lead us to a likely place, we got the same story we had heard from Interviewee #1 (Dabelatombo) that there was a man in their village, a Betsileo woodcutter named André, who spent more time in the woods than others and would know about such things if anyone would. He was away at the time, as he apparently went deep into the forests to the east to seek out certain valuable hardwoods.

On August 6, just before we left the region for fieldwork north of Morondava, André caught up with us. He was very busy, and could not talk then, he said, but indicated a willingness to guide us at some time in the future should we return. He was reluctant to discuss the kilopilopitsofy and kidoky, perhaps because he wanted to secure a fee first (which we declined politely) or perhaps because he really was pressed for time right then, as we certainly were. He stressed to us the vastness of the region to the east, and the sparseness of the population there. He cautioned that the region was avoided by people out of a general fear of *dahalo* (organized banditry).

A Composite Picture of the Kilopilopitsofy

A striking feature of the accounts of this mysterious animal is the consistency of details. All the accounts we have collected stress that the animal is nocturnal, grunts noisily, and flees to water when disturbed. Likewise, there is general agreement that it is cow-sized, hornless, dark in color, and has a large mouth with big teeth. These particulars are consistent with the accounts from previous centuries of the *mangarsahoc* (Flacourt 1661), the tsy-aomby-aomby (Audebert 1882; Ferrand 1893, cited in Godfrey 1986), and the omby-rano (Kaudern 1912, cited in Mahé and Sourdat 1972; Raybaud 1902). Various accounts, such as the Betsimisaraka folktales recorded by Ferrand, have perhaps exaggerated its ferocity (e.g., that it eats people—but note that many persons are killed by hippos in Africa, and the result of their slashing and trampling could look like partial consumption of the victim—see Godfrey 1986). Flacourt, in particular, stresses the large ears, as do our informants, and this is perhaps reflected in the peculiar etymology of the name mangarsahoc or *mangaro-tsaoka,* the latter being literally "covered chin," taken by Godfrey (1986) to indicate that the pendulous ears covered the chin. If this animal were a dwarf hippo as is often suggested (see Dewar 1984), then one would be tempted to postulate that it had larger ears than extant *Hippopotamus,* or else invoke the looseness of skin around the face typical of hippos as a feature easily interpreted in the dark, under the duress of an encounter with a large, unknown animal, as pendulous ears rather than loose cheeks and jowls. One might hazard the observation that, if Steunes (1989) is correct that the skull of some dwarf hippos—ones she places in the species *H. madagascariensis*—show clear modifications for terrestrial life, such as eyes on the side of the head rather than the top as is usual with hippos, then another terrestrial characteristic that would have been appropriate would be larger ears. Large ears help many tropical animals to dispel excess heat. *H. amphibius* thermoregulates on hot days by staying in the water, whereas the extant pygmy hippo of West Africa *(Choeropsis liberiensis)* may hide in the shade of thick bushes (Dorst and Dandelot 1970; Haltenorth and Diller 1980).

Flacourt (1661), attempting a rational explanation short of invoking the hippopotamus, guessed that the mangarsahoc was some sort of wild ass ("Je crois que ce peut être un ane sauvage"; Flacourt 1661:220) with long ears. Audebert (1882), after his futile search for the tsy-aomby-aomby, was convinced that the animal was a mere fabrication or perhaps an exaggerated account of a wild donkey. Of course, feral donkeys (as well as antlerless deer and camels, other animals that might come to mind, and that have been brought to the island on occasion), as well as any other conceivable animal but the hippo, would not be expected to exhibit what is one of the most universal habits described for these mystery animals in both nineteenth-century accounts and the present reports: the tendency to escape by going underwater. Among large mammals only a pinniped could be invoked for this behavior, and other features, notably rapid terrestrial locomotion and inland occurrences, do not fit well with any known seal. Among smaller mammals of other continents, there are a few African antelopes (e.g., sitatunga) and New World rodents (e.g., beaver and capybara) that exhibit this behavior but could not be mistaken in this context with a hippo or donkey-like animal and have never to our knowledge been brought to Madagascar. Raybaud (1902) boldly asserted that the stories he heard in the highlands were in fact stories of hippos that must have been living as late as 1878. After reviewing the evidence from history and folklore, Godfrey (1986:50) concludes that "the tsy-aomby-aomby was probably none other than the now extinct pygmy hippopotamus."

It is prudent to wonder whether the accounts from Belo-sur-mer are "corrupted tales" based on vague traditional knowledge of extinct large vertebrates with an added component of information regarding recently extinct taxa derived from European paleontological discoveries in the region. Anderson (1989:94), in reviewing the nineteenth-century accounts of moa (giant extinct ratite bird) sightings in New Zealand and Maori traditional stories of moa hunting, concludes:

> as soon as scientific reports about moas became available, Europeans used them to prompt Maori 'recollections.' . . . There was thus no shortage of potential information from foreign sources when Maoris were relentlessly quizzed about moas in the nineteenth and early twentieth centuries. If any had in fact retained genuine traditional lore about specific aspects of moa biology, it soon became submerged in the muddied pond of tainted assertion and cannot now be retrieved.

We prefer to reserve judgment as to whether the legends, including the modern ones recorded here, are derived from actual sightings of a presumably extinct hippo, or are merely old traditions with modern "contamination." We note the correspondences in detail between historical accounts and those we have collected in Belo-sur-mer. Our informants professed no knowledge of written accounts (whereby they might have incorporated details from earlier authors into fabricated personal experiences), but there is at least a possibility that some sort of re-telling of earlier stories could have occurred. Although we found no evidence for this kind of contamination, it is possible that conversations between local villagers and the large Malagasy work-crew with French paleontologist Charles Lamberton may have provided a nucleus for a modern folktale based on Lamberton's scientific discoveries in the area over a half century ago. If local people watched them removing "large bones, larger than any cow-bone," as Dabelatombo described, this could have made a strong impression. It is unlikely, but not inconceivable, that Pascou may even have

read Flacourt in school in the late 1920s, and he almost certainly read about African megafauna. The fact that the informants from Belo-sur-mer have a unique name for the creature, and additional plausible details not in the literature (notably, their imitation of a distinctive, hippo-like call), bears consideration. Although we initially thought that another explanation might lie in the localized repetition of stories from Mozambique or elsewhere across the Channel concerning extant African megafauna, the interviewees' rejection of the picture of the elephant as a representation of the kilopilopitsofy, and familiarity with the elephant, coupled with their selection of the hippo picture (but "with bigger ears") makes this obvious and simple explanation less compelling.

There is the remote possibility that the Belo informants saw an *H. amphibius* recently arrived from Africa through chance dispersal. Although the endemic Malagasy hippos must have evolved from ancestors who made this perilous crossing of approximately 400 km of open ocean, such events are almost certainly rare. Also, the universal insistence by the Belo-sur-mer interviewees that the animal was "cow-sized" (i.e., much smaller than the African hippo, which ranges between ca. 1–2.5 metric tons) and endowed with long floppy ears further adds to the implausibility of this explanation.

This would seem to leave us with the understandably controversial hypothesis, which we cannot test with present evidence, that these stories were generated by real experiences of living persons with a large animal with which the interviewees were unfamiliar, ascribed locally to the name kilopilopitsofy, and fitting the description of a small, long-eared hippopotamus. What kind of evidence would consititute a test? Obviously, a live hippo or a recently dead one would do the job. But how likely is this? Even if they were alive as late as 1976 (the latest firm report), there is no guarantee that they have not gone extinct since, and the chances of recent remains being preserved and subsequently discovered are extremely remote. Negative evidence, that is, looking and finding nothing, would, however, be an extremely weak refutation. Perhaps the most powerful disproof would be that either: (1) some other animal turns up in the vicinity that fits the description (e.g., a giant, semi-aquatic, long-eared donkey—perhaps a less reasonable likelihood than a living hippo), or (2) it is discovered that the elderly people encountered in the Belo-sur-mer region lied to the outsiders with such bureaucratic collusion as to generate independently the same detailed descriptions. With these doubts in mind let us consider the kidoky, Belo's other mystery creature.

A Composite Picture of the Kidoky

This animal's description is decidedly lemur-like. It was compared to the sifaka by all the interviewees who described it, although all universally insisted that it was not the same animal. The kidoky differs from the sifaka in many key respects. It is much larger—based on the young girl pointed out by Interviewee #4, perhaps 25 kg. It is usually encountered on the ground and may flee on the ground rather than taking to the trees. Its running gait is baboon-like (our terminology, based on one individual's demonstration and another's description). Its whooping call is suggestive of an indri, and quite unlike any recorded for *Propithecus*. Its face is more "like a man's" than a sifaka's. Finally, it is described as solitary, unusual behavior for a sifaka.

This picture bears both similarities and differences to Flacourt's (1661) description of the tretretretre. It also had a human-like face and solitary habits ("fort solitaire," p. 220). This creature, however, which Godfrey (1986) compares to the extinct giant arboreal lemur *Palaeopropithecus,* seems to have been larger than Belo's kidoky: Flacourt says "big as a calf of two years." Since it would be reasonable to guess that the name of the tretretretre is onomatopoeic, one might expect a chattering call, rather than a whoop.

So what, if anything, is a kidoky? Certainly, in terms of inferred size, terrestriality, and baboon-like gait, the most plausible candidates among the described extinct lemurs would probably be *Archaeolemur* and *Hadropithecus* (W. Jungers, pers. comm.). These two genera show numerous terrestrial adaptations and have been compared to baboons in terms of dentition, locomotor anatomy, and size (Tattersall 1973:94).

We have no ready explanation as to the origin of the kidoky stories. The types of reservations we have regarding the kilopilopitsofy generally apply here. Feral animals, for instance, are a vague possibility: baboons, rhesus monkeys, or other exotic primates could possibly survive on Madagascar if they were ever released there. Exotic candidates with the right kind of whooping call, however, are a problem for this explanation. Gibbons and howler monkeys might provide the right sounds, but they would have to be brought from Asia and the Neotropics, respectively, and are intensively arboreal species anyway. For an African candidate, one would have to look to the chimp (certainly, it has the "face of a man," and produces a variety of hoots and whoops), but even the bonobo is much too large, and generally chimps are adapted to humid forests, not semi-deserts.

A more parsimonious solution would be to dismiss the kidoky as a misidentified sifaka or other large extant lemur. This would be a more convincing argument if it were not for the numerous characteristics, listed above, in which the description consistently departs from the sifaka and other lemurs well known to these informants. We would be more comfortable with such a trivial solution if we had not confirmed for ourselves, by quizzing with unlabeled color plates and questions regarding lemur habits,

that the interviewees are competent wildlife observers who know the common animals of their region.

A Blind Test—The Case of the Bokyboky

At the time of these interviews, we were unaware that bokyboky or *bokiboki* was a local name for the viverrid *Mungotictis*. (Two other Malagasy names, *vontira* and *votsotsoke*, are used in many areas instead.) In other words, this was, until we returned home to our etymological sources, a third mystery animal. Thus we proceeded with the same caution in our handling of this interview subject. After some initial confusion, in which the nearly blind Interviewee #1, after much squinting, chose the aye-aye *(Daubentonia madagascariensis)* as the most similar animal in our pictures, other informants consistently pointed to a viverrid, either *Mungotictis* or some similar type. In their descriptions of the animal, they were fully accurate (raids chicken houses; loves to eat eggs, rats, and snakes; bears young in rainy season; has large ears and a broad face; cat-sized). Thus researchers and interviewees, in a sense, passed a "blind test," to the extent that we had concluded by the end of the interviews that the bokyboky was a viverrid, and probably not one of the more familiar ones such as the fossa *(Cryptoprocta ferox)*.

Perhaps eventually we will make a similar etymological discovery revealing a mundane identity for the kilopilopitsofy and the kidoky, and subsequently feel a little foolish. After initial hesitation to report these ethnographic data, we feel that they should be added to the record, to be taken merely for what they indisputably are: modern stories, said by interviewees to be eyewitness accounts, that show some interesting parallels with stories of unidentified animals that were first written down over 300 years ago. Whether these are stories of recently living examples of animals believed from radiocarbon evidence to have been extinct for centuries, or a massive case of mistaken identities, cannot be firmly decided with the evidence currently available.

Radiocarbon Evidence and the "Extinction Window"

A recently obtained radiocarbon date on fecal pellets associated with an *Archaeolemur* skeleton from a cave in northwest Madagascar (Burney et al. 1997) yielded a calibrated age of A.D. 1100–1440 at 2σ (95% confidence interval). Another recent date, on collagen from an *Archaeolemur* bone collected in the Ankarana Massif, also in the northwest, yielded a range of A.D. 990–1180 (Simons et al. 1995). Dates from this taxon as well as other extinct lemurs from a site at Belo-sur-mer likewise extend to the beginning of the present millennium (Burney 1997) and postdate the first evidence for humans in the region (MacPhee and Burney 1991) by almost a millennium. Recent dates on bones of two other large extinct lemurs, *Megaladapis* and *Palaeopropithecus*, from a remote cave in the southern interior, were 630 ± 50 and 510 ± 80 yr B.P. respectively (Simons 1995). At 2σ, these dates range from A.D. 1285–1420 and 1300–1625. This is temporally close indeed to Etienne de Flacourt, who collected an account around 1650 of an animal that may have been *Palaeopropithecus*. These dates serve to open the "extinction window" a little wider (see MacPhee and Burney 1991) and to foster renewed interest in these old stories of sightings of strange beasts. A program of carefully dating bones of the extinct megafauna from any recent-looking contexts is obviously in order.

As conservationists, we would like to believe that the extinct dwarf hippo and a giant lemur survived at Belo-sur-mer into the mid-twentieth century and that there is at least a vague hope that a few have held out in some remote pocket of suitable habitat in the western interior. More prudently, we must concede that the stories from Belo-sur-mer could be just interesting stories, conflating misidentified animals, old traditions that may be based on actual extinct beasts known to the ancestors of the Malagasy, and information from paleontology. For the time being, at least, neither paleontology nor oral tradition can fully resolve the mystery, but both are clearly relevant to the discussion.

Notes

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References Cited

Albignac, R.
1973 Faune de Madagascar. 36: Mammifères Carnivores. Paris: ORSTOM.

Anderson, A.
1989 Prodigious Birds: Moas and Moa-Hunting in Prehistoric New Zealand. New York: Cambridge University Press.

Audebert, J.-P.
1882 Im lande der Voilakertra aus Madagaskar. Globus 19:295–298.

Battistini, R., and J.-M Hoerner
1986 Géographie de Madagascar. Paris: EDICEF/SEDES.

Burney, D. A.
1997 Rates, Patterns and Processes of Landscape Transformation and Extinction in Madagascar. Proceedings of the symposium "Humans and Other Catastrophes: A New Look at Extinctions and the Extinction Process." New York: American Museum of Natural History, 6 pp.

Burney, D. A., H. F. James, F. V. Grady, J.-G.
Rafamantanantsoa, Ramilisonina, H. T. Wright, and J. B. Cowart
1997 Environmental Change, Extinction, and Human Activity: Evidence from Caves in NW Madagascar. Journal of Biogeography 24:755–767.

Chanudet, C.
1975 Conditions géographiques et archéologiques des subfossiles malgaches. Brest: Mémoire Maîtrise, Université de Bretagne Occidentale.

Deloria, V., Jr.
1995 Red Earth, White Lies: Native Americans and the Myth of Scientific Fact. New York: Scribner.

Dewar, R. E.
1984 Recent Extinctions in Madagascar: The Loss of the Subfossil Fauna. *In* Quaternary Extinctions: A Prehistoric Revolution. P. S. Martin and R. G. Klein, eds. Pp. 574–593. Tucson: University of Arizona Press.

Dorst, J., and P. Dandelot
1970 A Field Guide to the Larger Mammals of Africa. London: Collins.

Flacourt, E. de
1661 Histoire de la grande ile de Madagascar. Paris.

Godfrey, L. R.
1986 The Tale of the Tsy-aomby-aomby. The Sciences 1986:49–51.

Haltenorth, T., and H. Diller
1980 Field Guide to the Mammals of Africa Including Madagascar. London: Collins.

Jolly, A.
1980 A World Like Our Own: Man and Nature in Madagascar. New Haven, CT: Yale University Press.

Lamberton, C.
1946 Contribution à la connaissance de la faune subfossile de Madagascar. Note XV: Le *Plesiorycteropus madagascariensis* Filhol. Bulletin de l'Academie Malgache 25(1942–43):25–53.

MacPhee, R. D. E., and D. A. Burney
1991 Dating of Modified Femora of Extinct Dwarf *Hippopotamus* from Southern Madagascar: Implications for Constraining Human Colonization and Vertebrate Extinction Events. Journal of Archaeological Science 18:695–706.

Mahé, J., and M. Sourdat
1972 Sur l'extinction des vertébrés subfossiles et l'aridification du climat dans le sud-ouest de Madagascar. Bulletin de la Société Géologique de France 14:295–309.

Martin, P. S., and Klein, R. G., eds.
1984 Quaternary Extinctions: A Prehistoric Revolution. Tucson: University of Arizona Press.

Raybaud
1902 Rapport de M. l'administrateur Raybaud sur les gisements fossilifères d'Ampasambazimba. Bulletin de l'Academie Malgache 1(2):64–67.

Simons, E. L.
1995 Lemurs: Old and New. *In* Environmental Change in Madagascar. B. Patterson, S. Goodman, and J. Sedlock, eds. Pp. 14–15. Chicago: Field Museum.

Simons, E. L., D. A. Burney, P. S. Chatrath, L. R. Godfrey,
W. L. Jungers, and B. Rakotosamimanana
1995 AMS ^{14}C Dates for Extinct Lemurs from Caves in the Ankarana Massif, Northern Madagascar. Quaternary Research 43:249–254.

Steunes, S.
1989 Taxonomy, Habits, and Relationships of the Subfossil Madagascan Hippopotami *Hippopotamus lemerlei* and *H. madagascariensis*. Journal of Vertebrate Paleontology 9:241–268.

Tattersall, I.
1973 Cranial Anatomy of the Archaeolemurinae (Lemuroidea, Primates). Anthropological Papers of the American Museum of Natural History 52(1):1–110.

Thomas, K.
1983 Man and the Natural World. New York: Pantheon.

White, E. I.
1930 Fossil Hunting in Madagascar. Natural History Magazine II(15):209–235.